

Fourspine Stickleback (*Apeltes quadracus*)

Ecological Risk Screening Summary

Web Version – 10/17/2012



Figure 1: Image of fourspine stickleback (© cyric From EOL (2014)).

1 Native Range and Nonindigenous Occurrences

Native Range

From Fuller et al. (2012):

“Europe and Atlantic coast of North America. Atlantic Slope from Gulf of St. Lawrence to Trent River system, North Carolina. Mostly a nearshore marine species, but far inland populations occur in lakes in Nova Scotia, and in Hudson, Delaware, and Susquehanna River drainages (Page and Burr 1991).”

Nonindigenous Occurrences

From Fuller et al. (2012):

“Found in Lake Jackson, Alabama in 2002 (N. Nichols, pers. comm.). This species was introduced to the Great Swamp in New Jersey in 1969 (Stiles 1978). It was recorded from the Susquehanna River drainage in Pennsylvania (Denoncourt et al. 1975). The Pennsylvania record is based on two specimens taken in the fall of 1973 from an inlet stream of Harvey's Lake in Luzerne County, and 78 specimens taken in July 1965 from Big Spring Creek, a tributary of Conodquinet Creek, in Cumberland County. Also collected from Black River, Nipigon River, and Thunder Bay, Lake Superior, Canada (Mills 1993).”

Means of Introductions

From Fuller et al. (2012):

“Shipping, Ballast Water (EPA 2008). Denoncourt et al. (1975) were uncertain if the Susquehanna populations of this species, and that of several other additions to the drainage, represented natural occurrences or were the result of accidental introductions.”

“Bait shops in Alabama were found to be selling sticklebacks mixed in with fathead minnows at the time the specimens were collected (N. Nichols, pers. comm. [not cited]).”

Remarks

From Fuller et al. (2012):

“Present status in Alabama and New Jersey is unknown. Apparently established in Pennsylvania. Has become the dominant species in nearshore areas of Mission Marsh, Thunder Bay, Ontario (Stephenson and Momot 2000).”

“In 1986, an introduced population was discovered on the Canadian side of Lake Superior in Thunder Bay; the suggested means of introduction in that case was ballast water (Holm and Hamilton 1988). In 1995, *Apeltes* were also taken from the Black and Nipigon Rivers (Stephenson and Momot 2000).”

2 Biology and Ecology

Taxonomic Hierarchy

From ITIS (2012):

Kingdom Animalia
 Phylum Chordata
 Subphylum Vertebrata
 Superclass Osteichthyes
 Class Actinopterygii
 Subclass Neopterygii
 Infraclass Teleostei
 Superorder Acanthopterygii
 Order Gasterosteiformes
 Suborder Gasterosteoidei
 Family Gasterosteidae
 Genus *Apeltes*
 Species *Apeltes quadracus*

Taxonomic status: valid.

Size, Weight, Age

From Froese and Pauly (2010):

“Max length : 6.4 cm TL male/unsexed; (Page and Burr 1991); common length : 4.1 cm TL male/unsexed; (Hugg 1996); max. reported age: 3 years (Hugg 1996)”

Environment

From Froese and Pauly (2010):

“Marine; freshwater; brackish; benthopelagic; depth range ? - 3 m (Sargent et al. 2008)”

Climate/Range

From Froese and Pauly (2010):

“Temperate; 4°C - 20°C (Baensch and Riehl 1991); 51°N - 35°N”

Distribution

From Froese and Pauly (2010):

“Western Atlantic: Gulf of St. Lawrence in Canada to North Carolina, USA. Mainly a near-shore marine species, but far inland populations occur in lakes in Nova Scotia in Canada and in Hudson, Delaware and Susquehanna River drainages (Page and Burr 1991).”

Biology

From Froese and Pauly (2010):

“Occurs mainly along weedy bays and backwaters, entering brackish water and to a limited extent, fresh water.”

Human uses

From Froese and Pauly (2010): “Aquarium: public aquariums”

Diseases

None reported

Threat to humans

None reported

3 Impacts of Introductions

From Fuller et al. (2012):

“Confined to coasts. Rapid increases of *Apeltes* in Thunder Bay suggests the species is displacing native sticklebacks at a rapid rate (Stephenson and Momot 2000).”

From Queensland Government (2012):

[The fourspine stickleback] “would adversely affect native species by occupying similar niches and competing for common resources.”

Holm and Hamilton (1988) reviewed the introduction of this estuarine species into Lake Superior. A reproducing population was found in 1986 in Thunder Bay, Lake Superior. The nearest occurrence of the fish to the Lake Superior population is about 2,100 km away in Quebec near the mouth of the Batiscan River, the most likely mechanism of introduction is through ship's ballast water.

4 Global Distribution

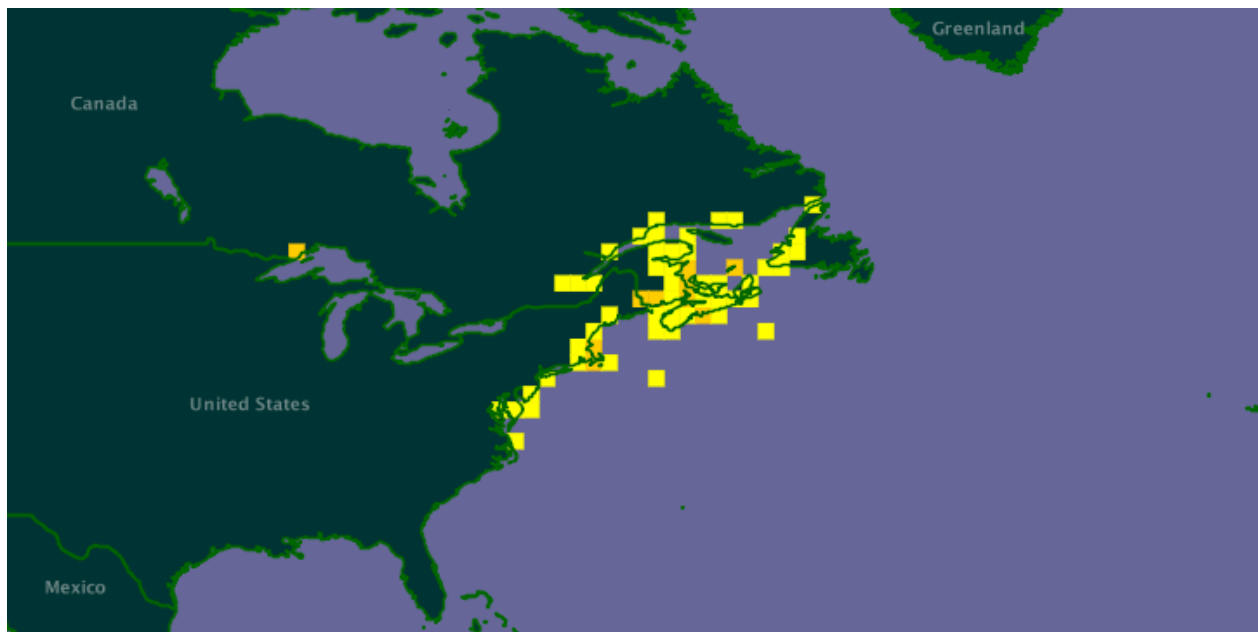


Figure 1 (above). Distribution of *A. quadracus*. Map from GBIF (2010).

5 Distribution within the United States



Figure 2 (above). Distribution of *A. quadracus* in the United States. Map from Fuller et al. (2012).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Science 2010;16 climate variables; Euclidean Distance) was high throughout the East, the Great Lakes, the northern US border, and parts of the Southeast. Medium matches through the plains and northern rockies. Low matches elsewhere. Climate 6 match indicated that the US has a high climate match. The range for a high climate match is 0.103 and greater; the climate match of *A. quadracus* is 0.398.

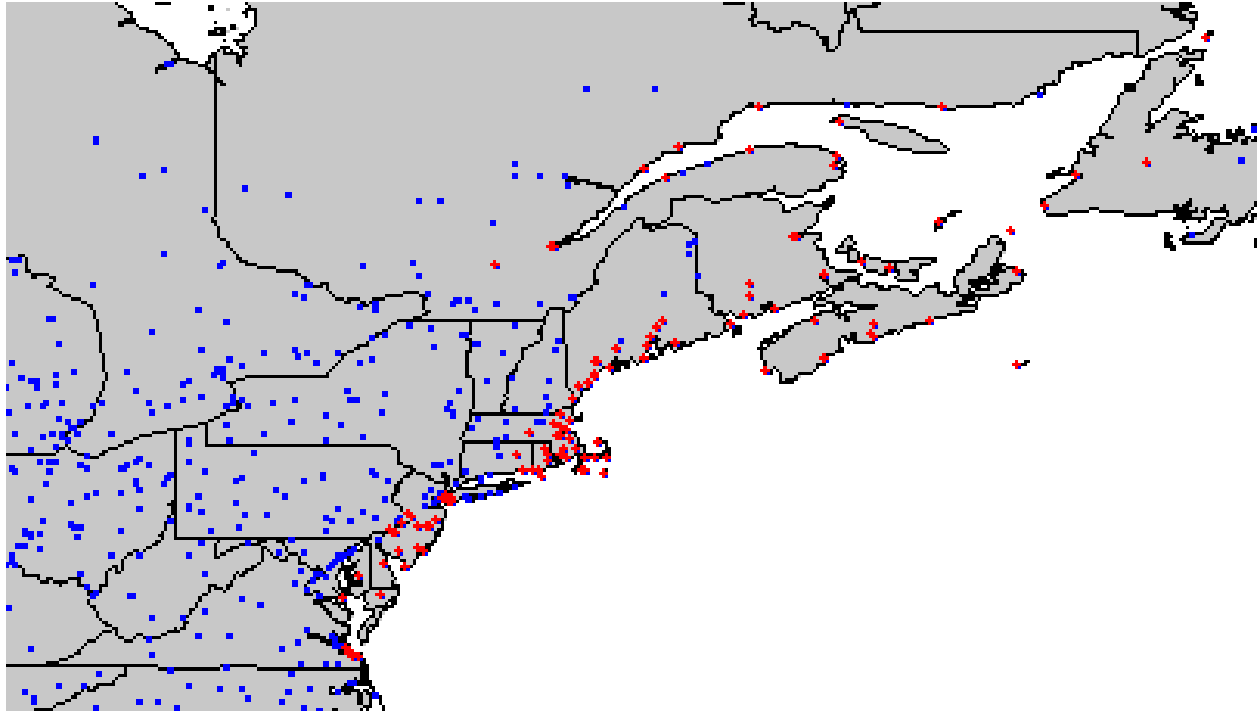


Figure 3 (above). CLIMATCH (Australian Bureau of Rural Science 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *A. quadracus* climate matching. Source locations from GBIF (2010) and Fuller et al. (2012). Only locations with established populations were used.

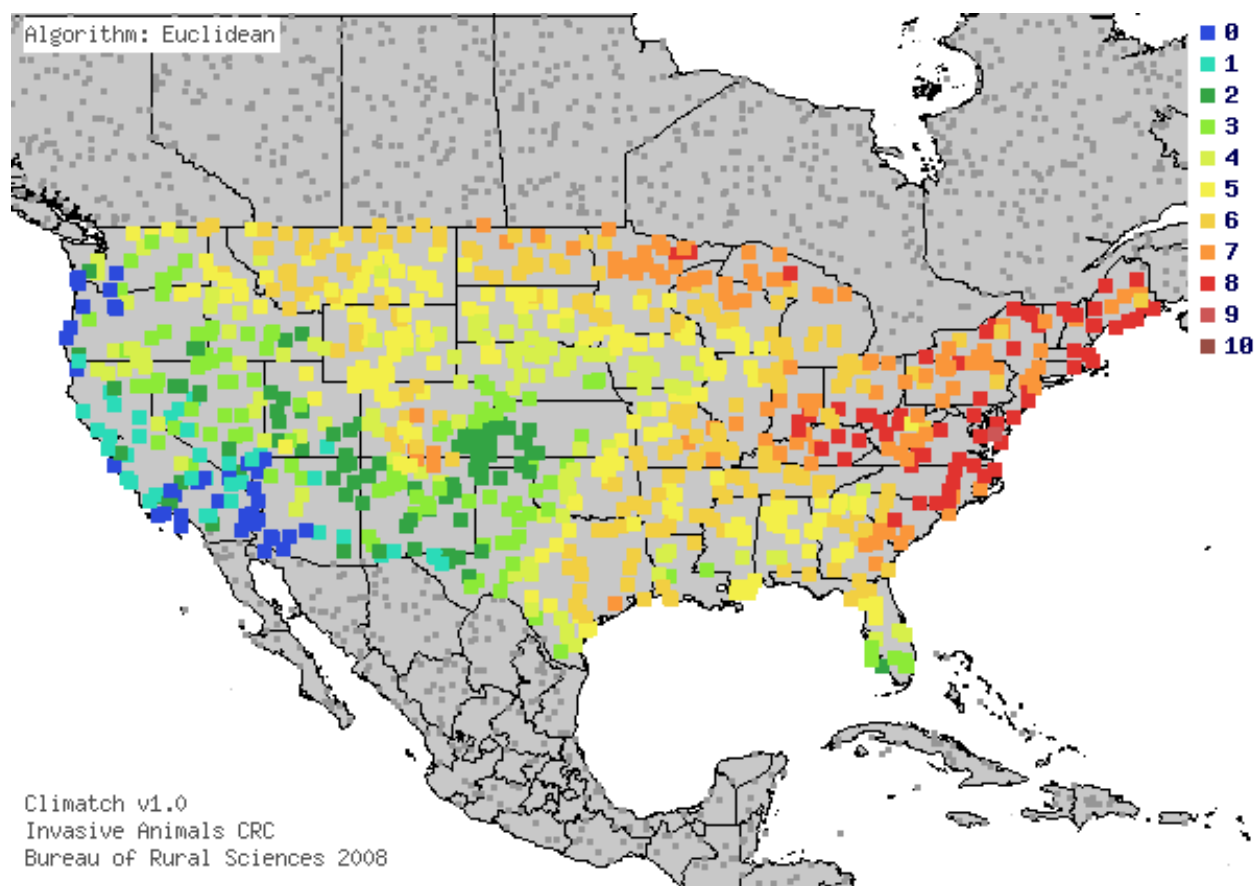


Figure 4 (above). Map of CLIMATCH (Australian Bureau of Rural Science 2010) climate matches for *A. quadracus* in the continental United States based on source locations reported by GBIF (2010) and Fuller et al. (2012). 0= Lowest match, 10=Highest match.

Table 1 (below). CLIMATCH (Australian Bureau of Rural Science 2010) climate match scores.

| CLIMATCH Score | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------------|--------------|----|----|-----|-----|-----|-----|-----|----|---|----|
| Count | 39 | 38 | 85 | 107 | 122 | 187 | 203 | 111 | 67 | 1 | 0 |
| | | | | | | | | | | | |
| Climate 6 Proportion = | 0.398 (High) | | | | | | | | | | |

7 Certainty of Assessment

Although there is some biological information on *A. quadracus* and the species does have some established populations outside of its native range, very little evidence of adverse impacts has been reported. The risk level is therefore uncertain, and the certainty of this risk is low.

8 Risk Assessment

Summary of Risk to the Continental United States

A. quadracus is established and spreading in parts of the East. Where it is established research suggests that it is replacing native congeners. Climate matching suggests that this species will expand its range. Though not used in the aquarium trade, this fish has been found mixed in with bait fish at bait shops.

Assessment Elements

- **History of Invasiveness (Sec. 3):** Uncertain
- **Climate Match (Sec. 6):** High
- **Certainty of Assessment (Sec.7):** Low
- **Overall Risk Assessment Category:** Uncertain

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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<http://creativecommons.org/licenses/by-nc/3.0/legalcode>. (September 2014).

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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